

10-16-00

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0002/PTO Rev. 6/99 10/13/00 	U. S. Department of Commerce Patent and Trademark Office	Attorney Docket Number 1162US	First Named Inventor Balmas
<b>NEW UTILITY PATENT APPLICATION TRANSMITTAL</b> <i>(to be used for new applications only)</i>		Total Pages in this Submission 10	

JCS41 U.S. PTO  
 09/687895  
 10/13/00

APPLICATION ELEMENTS	ACCOMPANYING APPLICATION PARTS						
<p>Notice: Checklist items mentioned under Application Elements section construct a new utility patent application. Please refer to MPEP Sections 506, 601, (37 CFR 1.77, 1.53, 35 USC 111, 112, 113) for detailed explanation regarding completeness of an original patent application</p> <ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> Fee Transmittal Form (prescribing filing fee(s))</li> <li>2. <input checked="" type="checkbox"/> Specification           <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Title of the Invention</li> <li><input checked="" type="checkbox"/> Cross References to Related Applications (if applicable)</li> <li><input type="checkbox"/> State Regarding Federally-sponsored Research Development (if applicable)</li> <li><input type="checkbox"/> Reference to Microfiche Appendix (if applicable)</li> <li><input checked="" type="checkbox"/> Background of the Invention</li> <li><input checked="" type="checkbox"/> Brief Summary of the Invention</li> <li><input checked="" type="checkbox"/> Brief Description of the Drawings (if drawings filed)</li> <li><input checked="" type="checkbox"/> Detailed Description</li> <li><input checked="" type="checkbox"/> Claim or Claims</li> <li><input checked="" type="checkbox"/> Abstract of the Disclosure</li> </ul> </li> <li>3. <input checked="" type="checkbox"/> Drawing(s) (when necessary as prescribed by 35 USC 113)</li> <li>4. <input type="checkbox"/> Executed Declaration</li> <li>5. Genetic Sequence Submission (if applicable, all must be included)           <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper Copy</li> <li><input type="checkbox"/> Computer Readable Copy</li> <li><input type="checkbox"/> Statement Verifying Identical Paper and Computer Readable Copy</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>6. <input type="checkbox"/> Assignment Papers</li> <li>7. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)</li> <li>8. <input type="checkbox"/> Computer Program in Microfiche</li> <li>9. <input type="checkbox"/> English Translation Document (if applicable)</li> <li>10. <input checked="" type="checkbox"/> Information Disclosure Statement / PTO-1449           <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Copies of IDS Citations</li> </ul> </li> <li>11. <input type="checkbox"/> Petition Checklist and Accompanying Petition</li> <li>12. <input type="checkbox"/> Preliminary Amendment</li> <li>13. <input type="checkbox"/> Proprietary Information</li> <li>14. <input checked="" type="checkbox"/> Return Receipt Postcard</li> <li>15. <input type="checkbox"/> Small Entity Statement</li> <li>16. <input type="checkbox"/> Additional Enclosures (please identify below)</li> </ol>						
<b>SIGNATURE OF APPLICANT, ATTORNEY OR AGENT (Send correspondence to:)</b>							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">Firm or Individual Name</td> <td style="vertical-align: top;">Douglas B. Farrow Graco Minnesota Inc. P. O. Box 1441 Mpls., MN 55440-1441</td> </tr> <tr> <td style="vertical-align: top;">Signature</td> <td style="vertical-align: top;"></td> </tr> <tr> <td style="vertical-align: top;">Date</td> <td style="vertical-align: top;">October 13, 2000</td> </tr> </table>		Firm or Individual Name	Douglas B. Farrow Graco Minnesota Inc. P. O. Box 1441 Mpls., MN 55440-1441	Signature		Date	October 13, 2000
Firm or Individual Name	Douglas B. Farrow Graco Minnesota Inc. P. O. Box 1441 Mpls., MN 55440-1441						
Signature							
Date	October 13, 2000						

FOR OFFICIAL USE ONLY					
Application Number		Class		Independent Claims	
Date of Receipt	Application Type	GAU		Total Claims	
	Filing Date	Foreign Filing License?		Drawings Sheets	
	Small Entity	Foreign Address?		Special Handling?	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**FEE TRANSMITTAL  
for FY 2000**

Patent fees are subject to annual revision.

Small Entity payments must be supported by a small entity statement,  
otherwise large entity fees must be paid. See Forms PTO/SB/09-12

See 37 C.F.R. §§ 1.27 and 1.28

*Complete if Known*

Application Number

Filing Date

First Named Inventor

Balmas

Group Art Unit

Examiner Name

Attorney Docket Number

1162US

**TOTAL AMOUNT OF PAYMENT**

\$ 710.00

**METHOD OF PAYMENT (check one)**

- 1.
- ☒
- The Commissioner is hereby authorized to charge indicated fees and credit any over payments to

Deposit Account  
Number

07-1775

Deposit Account  
Name☒ Charge any additional fee required under 37  
CFR 1.16 or 1.17

- 2.
- ☐
- Payment Enclosed
- 
- ☐
- Check
- ☐
- Money Order
- ☐
- Other

**FEE CALCULATION (fees effective 10/01/97)****1. BASIC FILING FEE**

Large Entity Small Entity

Fee Code	Fee (\$)	Fee Code	Fee (\$)	FEE DESCRIPTION	FEE PAID
101	710	201	355	Utility filing fee	710.00
106	320	206	160	Design filing fee	
107	450	207	245	Plant filing fee	
108	740	208	355	Reissue filing fee	
114	150	214	75	Provisional filing fee	
SUBTOTAL (1)					\$ 710.00

**2. EXTRA CLAIM FEES**

Total Claims	Extra	Fee from below	Fee Paid
Independent Claims	-20** =	X	=
Multiple Dependent Claims	-3** =	X	=

\*\*or number previously paid, if greater; For Reissues, see below

Large Entity Small Entity

Fee Code	Fee (\$)	Fee Code	Fee (\$)	Fee Description
103	18	203	09	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claims, if not paid
109	80	209	40	**Reissue independent claims over original patent
110	18	210	09	**Reissue claims in excess of 20 and over original patent

**FEE CALCULATION (continued)****3. ADDITIONAL FEES**

Large Entity Small Entity

Code	(\$)	Code	(\$)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2520	147	2520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1840*	113	1840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1390	218	695	Extension for reply within fourth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1510	138	1510	Pet. to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1240	241	620	Petition to revive - unintentional	
142	1240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Statement	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR 1.129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR 1.129(b))	
Other fee (specify)					
Other fee (specify)					

\*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) \$ 0.00

**SUBMITTED BY**

Name	Douglas B. Farrow	Registration No.	28582	Telephone:	612-623-6769
Signature		Date	October 13, 2000		

Complete (if applicable)

Burden Hour Statement This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark office, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.  
SEND TO: Assistant Commissioner for Patents, Washington, D.C. 20231.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Attorney Docket Number: 1162US

Inventor's Names and Addresses:

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Citizenship:

United States

Title of Invention:

Sealant Dispensing Correction Method

Send Correspondence To:

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Corporate Intellectual Property Counsel  
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Minneapolis, MN 55440-1441

# **SEALANT DISPENSING CORRECTION METHOD**

## **RELATED APPLICATIONS**

This application is a continuation-in-part of US Application serial number  
5 60/159,141, filed October 13, 1999.

## **BACKGROUND OF THE INVENTION**

Apparatus for dispensing sealants and adhesives and similar materials robotically  
are well known and typified by U.S. Patent No. 5,847,285 (the contents of which are  
10 incorporated by reference) and the patents referenced and cited therein.

## **SUMMARY OF THE INVENTION**

In summary, the method of the instant invention forms a calibrated relationship  
between pressure and flow rate. The invention as described herein can be utilized in  
15 products such as Graco's PrecisionFlo™ dispenser as a software modification. Pressure is  
measured with a transducer device which provides a 1 to 5 volt output which corresponds  
to 0 to 3500 PSI. The voltage is converted to a pulse width using an external analog to  
digital device. Flow rate is measured with a helical type flow meter which provides a  
pulse corresponding to a calibrated volume passing through it.

The relationship is discovered by dispensing an amount of material and measuring the pressure and flow rate, adjusting the pressure until a user specified flow rate (typically the max flow rate) is achieved within a tolerance. This process is then repeated eight (8) times and a mean pressure to flow rate relationship is established and recorded. The set point for the device is then assumed to be a linear function with the calibrated point as the maximum value and 0,0 is the minimum value.

As the command signal to the unit is modified (for dispensing sealant at a percentage of maximum, e.g. if calibrated at 500 cc/min., a half range signal would represent a 250 cc/min. command) the pressure range for the calibrated point is either extrapolated or interpolated as necessary in order to achieve the correct flow rate. As a result, each time the unit dispenses, it is also recalibrated. This method provides immediate correction for changes in system fluid dynamics thus allowing for a more consistent and predictable dispense profile.

In the preferred embodiment of the instant invention, where the example aforementioned has the max flow rate of 500 cc/min., a half scale level of 250 cc/min. is utilized. The response curve is divided into two segments above and below the median speed dip (half flow rate point) and the slope of the straight line is adjusted accordingly.

These and other objects and advantages of the invention will appear more fully from the following description made in conjunction with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views.

## **A BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 shows the pressure/flow table as initially established and after adjustment.

5

## **DESCRIPTION OF THE PREFERRED EMBODIMENT**

In summary, the method of the instant invention forms a calibrated relationship between pressure and flow rate. The invention as described herein can be utilized in products such as Graco's PrecisionFlo™ dispenser as a software modification. Pressure is measured with a transducer device which provides a 1 to 5 volt output which corresponds to 0 to 3500 PSI. The voltage is converted to a pulse width using an external analog to digital device. Flow rate is measured with a helical type flow meter which provides a pulse corresponding to a calibrated volume passing through it.

The relationship is discovered by dispensing an amount of material and measuring the pressure and flow rate, adjusting the pressure until a user specified flow rate (typically the max flow rate) is achieved within a tolerance. This process is then repeated eight (8) times and a mean pressure to flow rate relationship is established and recorded. The set point for the device is then assumed to be a linear function with the calibrated point as the maximum value and 0,0 is the minimum value.

As the command signal to the unit is modified (for dispensing sealant at a percentage of maximum, e.g. if calibrated at 500 cc/min., a half range signal would

represent a 250 cc/min. command) the pressure range for the calibrated point is either extrapolated or interpolated as necessary in order to achieve the correct flow rate. As a result, each time the unit dispenses, it is also recalibrated. This method provides immediate correction for changes in system fluid dynamics thus allowing for a more  
5 consistent and predictable dispense profile.

In the preferred embodiment of the instant invention, where the example  
aforementioned has the max flow rate of 500 cc/min., a half scale level of 250 cc/min. is  
utilized. The response curve is divided into two segments above and below the median  
speed dip (half flow rate point) and the slope of the straight line is adjusted accordingly.  
10 For example, in Figure 1, slope B represents the initial calibration while slopes A and C  
represent corrected linear relationships.

It is contemplated that various changes and modifications may be made to the  
dispensing correction method without departing from the spirit and scope of the invention  
as defined by the following claims.

WHAT IS CLAIMED IS:

1. A method for flow correction of the calibrated relationship between pressure and flow rate comprising the steps of:

initially measuring the flow of a fluid through a dispensing device and forming a

5 linear relationship between pressure and flow, said linear relationship having a maximum flow point and a slope;

providing a desired flow rate;

interpolating the desired pressure for said desired flow rate from said linear relationship;

10 dispensing through said dispensing device according to said desired pressure; and

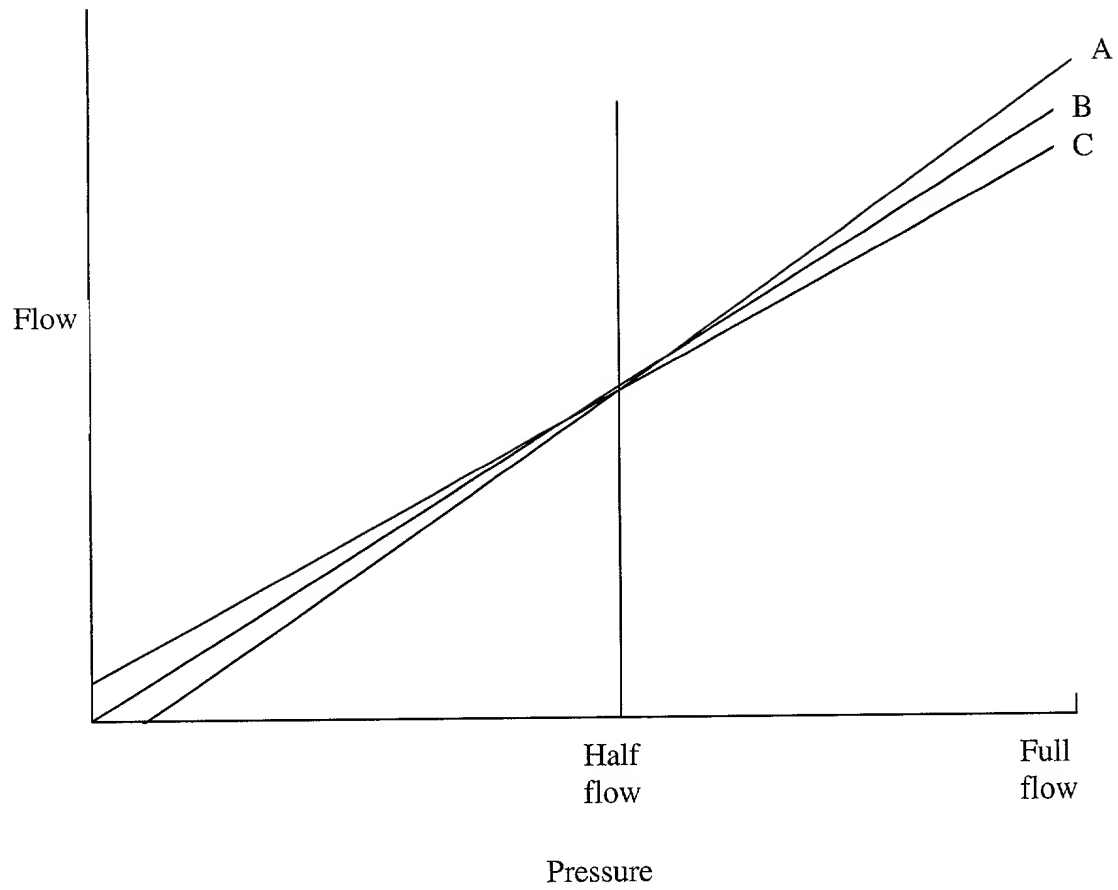
measuring the flow through said dispensing device during subsequent dispense cycles and adjusting said slope to yield the desired dispense volume.

2. A method of flow correction of claim 1 wherein said linear relationship is divided into at least two segments, the slope of each of said segments being adjusted individually.



## **ABSTRACT**

As the command signal to a unit for dispensing sealant is modified, the pressure range for the calibrated point is either extrapolated or interpolated as necessary in order to achieve the correct flow rate. As a result, each time the unit dispenses, it is also  
5 recalibrated. This method provides immediate correction for changes in system fluid dynamics thus allowing for a more consistent and predictable dispense profile.



**Figure 1**